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# HIGHWAY AND RAILROAD EQUIPMENT FOR TRANSPORTING PERISHABLES IN EUROPE

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## PREFACE

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# HIGHWAY AND RAILROAD EQUIPMENT FOR TRANSPORTING PERISHABLES IN EUROPE

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## INTRODUCTION

European transport equipment and regulations governing its use are often different from those in the United States. Shippers and carriers should be aware of these differences so their exports will (1) be properly packaged; (2) have adequate refrigeration; (3) be correctly routed; (4) receive special services, if needed; and (5) be of an acceptable load size and weight.

Imports arriving in Europe as break-bulk cargo via conventional ships are traditionally discharged to pier-side warehouses. They are assembled in lots, cleared by customs, and prepared for transfer to trucks, rail carriers, or barges for inland shipment. The methods by which perishable imports are held and transported can materially affect their ultimate arrival condition and are therefore of vital concern to the shipper. If the shipper is aware of the various types of equipment and services available for his commodities, and of the regulations governing their movement, he will be able

to specify how his shipments should be handled.

Van containers arriving in Europe are handled in much the same way as they are in the United States. Ocean carriers have brought this about because of the large volume of movements and the economic necessity for compatible systems in each country.

Highway weight laws in Europe vary from country to country, but most van sizes and payloads from U.S. shipping points are acceptable in European countries.

The information contained in this bulletin is intended as a guide for shippers and carriers to alert them to specific problem areas. The information should be updated periodically to comply with frequent changes in foreign regulations as they occur. *Shippers should always verify regulations applicable to specific destinations with their ocean carrier.*

## HIGHWAY TRANSPORTATION

### Types Of Trucks

The most popular heavy-duty freight vehicle in Europe is the straight truck. Such trucks are built with two or three axles and usually have an 18- to 22-foot (5.49- to 6.71-meter) body. They are powered with large diesel engines and nor-

mally pull a 20- to 24-foot (6.1- to 7.32-m) full trailer to attain maximum cargo limits. Truck tractors and semitrailers are also popular in Europe and account for a large part of the highway freight traffic. Examples of the several types of trucks are shown in figures 1, 2, and 3.



PN-5115

FIGURE 1.—Heavy-duty European straight truck and full trailer with tarpaulin covers to protect cargo.



PN-5116

FIGURE 2.—Medium-duty European straight truck with insulated metal body and self-contained refrigeration system.

Some of these trucks have insulated bodies and are equipped with mechanical refrigeration units. Others have flatbed bodies with removable stake sides and are usually covered with tarpaulins. During cold weather, the tarpaulins are sometimes insulated on the inside to afford protection against freezing. Large quantities of fresh fruits and vegetables move throughout Europe in these tarpaulin-covered open trucks with fairly good success. However, for best protection of highly perishable fresh fruits and vegetables shipped to inland European destinations, U.S. export shippers should specify temperature-controlled, refrigerated trucks.

Semitrailer chassis used for transporting van containers from a port to an inland destination are usually supplied by the ocean carrier and comply with the International Standards Organization (ISO) sizes of 8 feet (2.44 m) wide and 20 or 40 feet (6.1 or 12.2 m) long.



PN-5117

FIGURE 3.—Heavy-duty European tractor semitrailer with insulated metal body and self-contained refrigeration system.

### Sizes Of Loads

European trucks carry approximately the same load weights as U.S. trucks, and their inside dimensions are also about equal. Therefore, standard truckload lots of fresh fruits and vegetables up to 40,000 pounds of payload can usually be handled without a problem. Exceptions to this allowance are listed in the section on "Vehicle Weight and Size Regulations."

Palletization is used extensively in Europe. The European 120- by 100-cm pallet corresponds closely to our 48- by 40-inch pallet and is readily handled by European carriers. The 42- by 35-in (107 by 89 cm) pallet commonly used by many western U.S. shippers, will also fit European vehicles.

### Delivery Schedules

Deliveries of perishables from major European ports to inland destinations usually can be made in 1 to 2 days. In most cases, shipments cleared by customs at the port of discharge on one day can be delivered to the receiver on the next day. An example of distances between major cities in Europe is shown in figure 4. European truckers can travel about 1,000 kilometers (621 miles) in 24 hours. Examples of delivery schedules from Rotterdam to selected cities are shown in table 1.

Shippers should select a port close to a particular inland destination to reduce trucking time and costs. However, in some cases, several days in transit time can be saved by discharging the cargo at the first port of call, even though it may not be the closest port, and moving it by truck to final

destination. This practice is often followed for highly perishable commodities that have a limited shelf life or an urgent market demand.

## Truck Freight Rates

Examples of current truck freight rates for refrigerated and nonrefrigerated cargo from Rotterdam to selected destinations are shown in table 2. Frequently, U.S. shippers are not concerned

with these rates because ocean carriers quote combined rates to final destination or delivery is made to the receiver at the port of discharge. However, these examples provide the shipper with a reference useful in calculating total transport costs.

## Vehicle Weight and Size Regulations

Vehicle weight and size regulations vary throughout Europe, just as they do in the United



FIGURE 4.—Distances between major points in Europe. (All figures are in kilometers.)

TABLE 1.—*Delivery schedules from Rotterdam to selected points in Europe by train and truck*

Rotterdam to—	Train		Truck
	Perishables		Normal freight and containers
	freight train	Container train	
Antwerp, Belgium	7	4	2
Paris, France	17	9	9
Lyon, France	31	31	18
Basel, Switzerland	16	13	15
Milan, Italy	38	26	38
Vienna, Austria	31	31	35
Munich, Germany	22	17	15
Frankfurt, Germany	14	8	9
Hamburg, Germany	13	17	9
London, England	<sup>1</sup> 61	<sup>1</sup> 43	<sup>1</sup> 15
Stockholm, Sweden	<sup>1</sup> 46	<sup>1</sup> 26	<sup>1</sup> 36
Copenhagen, Denmark	<sup>1</sup> 28	<sup>1</sup> 18	<sup>1</sup> 18

<sup>1</sup> Including time on ferry.

TABLE 2.—*Average freight rates for perishables from Rotterdam to selected points in Europe<sup>1</sup>*

From Rotterdam to :	Non-refrigerated transport		Refrigerated transport (32° F (0° C))		Refrigerated transport (0° F (-18° C))		Container transport (40 ft (12.2m))	
	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck
U.S. dollars per metric ton (2204.6 lb)								
Antwerp, Belgium	11.20	6.10	14.70	7.60	27.80	8.20	4.28	4.70
Paris, France	27.90	29.60	32.20	37.00	47.40	40.00	35.79	21.70
Lyon, France	39.40	44.70	43.70	55.90	64.30	60.40	47.86	41.60
Basel, Switzerland	34.00	39.20	37.50	49.00	59.30	52.90	34.89	38.20
Milan, Italy	54.80	61.40	59.70	76.80	80.00	82.90	62.33	69.30
Vienna, Austria	44.00	49.60	49.50	62.00	89.70	67.00	64.75	58.20
Munich, Germany	43.40	40.20	46.80	50.30	68.50	54.30	44.74	40.90
Frankfurt, Germany	29.80	26.80	33.20	33.50	50.20	36.20	31.33	22.39
Hamburg, Germany	31.70	27.60	35.10	34.50	53.30	37.30	32.87	23.50
London, England	<sup>2</sup> 49.20	43.12	<sup>2</sup> 54.90	45.90	----	53.90	----	<sup>2</sup> 8.30
Stockholm, Sweden	<sup>2</sup> 62.10	63.80	<sup>2</sup> 68.90	79.80	94.40	68.10	<sup>2</sup> 65.16	<sup>2</sup> 68.00
Copenhagen, Denmark	<sup>2</sup> 43.60	41.10	<sup>2</sup> 48.70	51.40	71.40	55.50	<sup>2</sup> 47.36	<sup>2</sup> 40.20

<sup>1</sup> Per Feb. 1, 1976, based on loads of 20 metric tons.

<sup>2</sup> Excluding ferry cost.

States. Most countries allow a vehicle height of 13 ft 1 in (3.99 m), a width of 98 in (2.49 m), and a length of 49 ft 2 in (14.98 m). Single axle-load limits range from 17,640 to 28,665 lb (8,000 to 13,000 kg), whereas tandem limits range from 26,460 to 46,305 lb (12,000 to 21,000 kg). The gross vehicle weight allowed in most countries is 83,790 lb (38,000 kg) for five-axle units, which is comparable to limits allowed in the United States. Therefore, the same figures can be used when calculating truckload equivalents for delivery in Europe.

Tables 3, 4 and 5 summarize the current European weight and size regulations. Exceptions and special allowances for these regulations are found in the Appendix. Since these regulations are subject to frequent change, shippers are advised to contact their carriers for up-to-date information.

TABLE 3.—European size and weight regulations for highway vehicles

European Economic Community (EEC) countries <sup>1</sup>	Height	Width	Length of tractor and semitrailer	Axeeload		Gross weight limits		
				Single	Tandem	3 axles	4 axles	5 axles
	Feet-inches (Meters)	Inches (Meters)	Feet-inches (Meters)			Pounds (Kilograms)		
Netherlands	13- 1 (4.0)	<sup>a</sup> (2) 98 (2.5)	49- 2 (15)	<sup>b</sup> 22,050 (10,000)	<sup>b</sup> 53,280 (16,000)	<sup>c</sup> 110,250 (50,000)	<sup>c</sup> 110,250 (50,000)	<sup>c</sup> 110,250 (50,000)
Belgium	13- 1 (4.0)	98 (2.5)	49- 2 (15)	28,665 (13,000)	<sup>d</sup> 44,100 (20,000)	83,790 (38,000)	83,790 (38,000)	83,790 (38,000)
Luxembourg	13- 1 (4.0)	98 (2.5)	49- 2 (15)	28,665 (13,000)	44,100 (20,000)	83,790 (38,000)	83,790 (38,000)	83,790 (38,000)
West Germany	13- 1 (4.0)	98 (2.5)	49- 2 (15)	<sup>e</sup> 22,050 (10,000)	<sup>f</sup> 35,280 (16,000)	57,330 (26,000)	79,380 (36,000)	83,790 (38,000)
France	<sup>g</sup>	98 (2.5)	49- 2 (15)	28,665 (13,000)	46,305 (21,000)	<sup>g</sup> 83,790 (38,000)	<sup>g</sup> 83,790 (38,000)	<sup>g</sup> 83,790 (38,000)
Italy	13- 1 (4.0)	98 (2.5)	45-11 (14)	22,050 (10,000)	<sup>h</sup> 31,972 (14,500)	39,690 (18,000)	61,740 (28,000)	70,560 (32,000)
England	<sup>i</sup>	98 (2.5)	49- 2 (15)	22,050 (10,000)	<sup>i</sup> 37,485 (17,000)	<sup>j</sup> 44,100 (20,000)	<sup>j</sup> 48,510 (20,640)	<sup>j</sup> 52,920 (24,000)
Denmark	<sup>k</sup> 12- 5 (3.8)	98 (2.5)	<sup>l</sup> 49- 2 (15)	<sup>m</sup> 22,050 (10,000)	<sup>n</sup> 35,280 (16,000)	<sup>o</sup> 83,790 (38,000)	<sup>o</sup> 83,790 (38,000)	<sup>o</sup> 83,790 (38,000)
Ireland	<sup>o</sup>	98 (2.5)	49- 2 (15)	22,050 (10,000)	<sup>p</sup> 35,280 (16,000)	48,510 (20,640)	<sup>q</sup> 55,125 (25,000)	<sup>q</sup> 55,125 (25,000)

<sup>1</sup> Situation as of Feb. 1, 1976.<sup>2</sup> Letter symbols refer to explanations in the Appendix for table 3, pp. 12-14.<sup>3</sup> No limit.

TABLE 4.—European size and weight regulations for highway vehicles

Western European countries <sup>1</sup>	Height	Width	Length of tractor and semitrailer	Axeeload limits		Gross weight limits		
				Single	Tandem	Pounds (Kilograms)		
	Feet-inches (Meters)	Inches (Meters)	Feet-inches (Meters)			(a)	(a)	(a)
Norway	<sup>o</sup>	<sup>a</sup> (3) 98 (2.5)	<sup>a</sup> 49- 2 (15)	<sup>a</sup> 17,640 (8,000)	<sup>a</sup> 26,460 (12,000)	<sup>(a)</sup>	<sup>(a)</sup>	<sup>(a)</sup>
Sweden	<sup>o</sup>	98 (2.5)	78- 8 (24)	<sup>b</sup> 22,050 (10,000)	<sup>c</sup> 35,280 (16,000)	<sup>(d)</sup>	<sup>(d)</sup>	<sup>(d)</sup>
Austria	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	<sup>e</sup> 35,280 (16,000)	83,790 (38,000)	83,790 (38,000)	83,790 (38,000)
Switzerland	13- 1 (4)	<sup>t</sup> 98 (2.5)	52- 4 (16)	22,050 (10,000)	<sup>g</sup> 39,690 (18,000)	61,740 (28,000)	61,740 (28,000)	61,740 (28,000)
Portugal	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	<sup>h</sup> 35,280 (16,000)	57,330 (26,000)	70,560 (32,000)	83,790 (38,000)
Finland	13- 1 (4)	98 (2.5)	49- 2 (15)	17,640 (8,000)	28,665 (13,000)	<sup>i</sup> 66,150 (30,000)	<sup>i</sup> 66,150 (30,000)	<sup>i</sup> 66,150 (30,000)
Spain	13- 1 (4)	98 (2.5)	<sup>l</sup> 54- 1 (16.5)	28,665 (13,000)	<sup>k</sup> 46,305 (21,000)	<sup>l</sup> 83,790 (38,000)	<sup>l</sup> 83,790 (38,000)	<sup>l</sup> 83,790 (38,000)
Greece	13- 1 (4)	98 (2.5)	49- 2 (15)	<sup>m</sup> 22,050 (10,000)	35,280 (16,000)	63,945 (29,000)	83,790 (38,000)	83,790 (38,000)
Turkey	13- 1 (4)	98 (2.5)	45-11 (14)	17,640 (8,000)	31,972 (14,500)	<sup>(n)</sup>	<sup>(n)</sup>	<sup>(n)</sup>

<sup>1</sup> Other than those in EEC. Situation as of Feb. 1, 1976.<sup>2</sup> No limit.<sup>3</sup> Letter symbols refer to explanations in the Appendix for table 4, pp. 14-15.

TABLE 5.—European size and weight regulations for highway vehicles

Eastern European countries <sup>1</sup>	Height	Width	Length of tractor and semitrailer	Axleload limits		Gross weight limits		
				Single	Tandem	3 axles	4 axles	5 axles
	Feet-inches (Meters)	Inches (Meters)	Feet-inches (Meters)			Pounds (Kilograms)		
Bulgaria	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	44,100 (20,000)	77,175 (35,000)	77,175 (35,000)	77,175 (35,000)
East Germany	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	35,280 (16,000)	57,330 (26,000)	70,560 (32,000)	83,790 (38,000)
Hungary	13- 1 (4)	98 (2.5)	45-11 (16.75)	22,050 (10,000)	<sup>a(c)</sup> 35,280 (16,000)	61,740 (28,000)	70,560 (32,000)	83,790 (38,000)
Yugoslavia	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	35,280 (16,000)	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
Poland	13- 1 (4)	98 (2.5)	49- 2 (15)	<sup>c</sup> 22,050 (10,000)	<sup>d</sup> 35,280 (16,000)	70,560 (32,000)	70,560 (32,000)	83,790 (38,000)
Romania	13- 1 (4)	98 (2.5)	54- 1 (16.5)	<sup>e</sup> 22,050 (10,000)	<sup>f</sup> 35,280 (16,000)	<sup>g</sup> 57,330 (26,000)	<sup>h</sup> 70,560 (32,000)	<sup>i</sup> 83,790 (38,000)
U.S.S.R.	12- 5 (3.8)	98 (2.5)	65- 7 (20)	<sup>j</sup> 22,050 (10,000)	<sup>k</sup> 39,690 (18,000)	<sup>l</sup> 55,125 (25,000)	<sup>m</sup> 72,765 (33,000)	<sup>n</sup> 88,200 (40,000)
Czechoslovakia	13- 1 (4)	98 (2.5)	49- 2 (15)	22,050 (10,000)	35,280 (16,000)	57,330 (26,000)	70,560 (32,000)	83,790 (38,000)

<sup>1</sup> Situation as of Feb. 1, 1976.<sup>2</sup> Letter symbols refer to explanations in the Appendix for table 5, p. 15.

## RAILROAD TRANSPORTATION

Most European countries have their own state or partly state-operated, national railroads. The temperature-controlled equipment of these railroads is assigned to one European organization called Interfrigo.<sup>1</sup> This organization was founded in 1949 by six countries and had grown to 21 members in 1973. Its activities cover most of the European continent and the Mediterranean area. In 1974, Interfrigo operated approximately 18,500 refrigerated railcars belonging to various member countries. In addition, it manages over 8,000 of its own cars fitted with ice or mechanical refrigeration equipment, as well as 410 of its own 20- and 40-foot (6.1- and 12.2-m) mechanically refrigerated van containers.

### Types Of Railroad Cars

Four general types of railroad cars are used for transporting perishables in Europe: (1) Dry/ven-

tilated cars (fig. 5); (2) water-ice refrigerated cars (fig. 6); (3) mechanical refrigerated cars (fig. 7); and (4) van container cars (fig. 8).

Most European railcars are built with only two axles and are smaller than their U.S. counterparts. However, some of the newer mechanically refrigerated cars are larger and are built with four axles, similar to U.S. models. The payload of each type of car depends on the speed of the



PN-5118

FIGURE 5.—European dry/ventilated railcar.

<sup>1</sup> Mention of a trade name here is solely to provide specific information. It does not constitute an endorsement by the U.S. Department of Agriculture over other companies not mentioned.



FIGURE 6.—European water-ice refrigerated railcar.  
PN-5119



FIGURE 7.—European mechanically refrigerated railcar.  
PN-5120

train and the destination country. The general specifications and load capacities of these four types of European railroad cars are given in tables 6, 7, 8, and 9.

#### Delivery Schedules

Throughout Europe, there is excellent rail service from principal ports to inland destinations. Figure 9 illustrates the major rail routes of Eu-



FIGURE 8.—European refrigerated van container on railcar.  
PN-5121

rope. The railroads offer fast service to distant points and eliminate many of the problems associated with highway travel during bad weather in the winter or heavy traffic during the summer tourist season. In addition, the railroads are much more efficient than highway trucks in converting diesel fuel to ton miles.

Table 1 shows current rail schedules for cars and van containers shipped from Rotterdam to selected points.

In England, special service for van containers is provided by British Rail. In most cases, overnight service is offered from the ports to inland destinations. Similarly, in Sweden, van containers move from the main port in Gothenberg to Stockholm in overnight service.

#### Railroad Freight Rates

Rail freight rates in Europe are generally higher than truck rates for short hauls and lower than truck rates for long hauls. Table 2 shows some typical rates from Rotterdam to selected points. *Since these rates are subject to change, shippers should consult their freight forwarder for current charges.*

### CONCLUSIONS AND RECOMMENDATIONS

A wide variety of transport services and equipment are available in Europe to distribute imported U.S. perishable products. Rail and truck carriers can make deliveries of U.S. imports to most European markets within 2 days after arrival at the receiving port. A full line of equipment, ranging from dry vans to mechanically refrigerated vans, affords the shipper a wide choice

of services to meet the special requirements of his products.

The widespread use of intermodal refrigerated van containers by U.S. exporters eliminates many of the former problems associated with break-bulk cargo handling. Many cargoes now move from U.S. shipping points to final overseas destinations in the same van container with no inter-

mediate handling. However, large quantities of U.S. perishable products are still unloaded at the foreign port and transferred to other vehicles for distribution. U.S. exporters should be aware of this extra handling, even though it may not be under their control. Foreign receivers should be encouraged to use the proper service and equipment for good product protection. To place U.S. perishables in a competitive position with local produce or other imports, U.S. exporters and foreign distributors should follow temperature and

handling recommendations provided in U.S. Department of Agriculture Handbooks 66<sup>2</sup> and 105<sup>3</sup> and ARS 51-48.<sup>4</sup>

<sup>2</sup> Lutz, J. M., and Hardenburg, R. E. The commercial storage of fruits, vegetables, and florist and nursery stocks. U.S. Dept. Agr., Agr. Handb. 66, 94 pp. 1968.

<sup>3</sup> Ashby, B. Hunt, Protecting perishable foods during transport by motortruck. U.S. Dept. Agr., Agr. Handb. 105, 141 pp. 1970.

<sup>4</sup> Lipton, Werner J. and Harvey, John M. Compatibility of fruits and vegetables during transport in mixed loads. U.S. Dept. Agr., Agr. Res. Serv. ARS 51-48, 4 pp. 1972.

TABLE 6.—European dry and rented railroad cars (fig. 5)—general specifications

Outside length	Standard car	Large-capacity car	Very large capacity car	Very large capacity pallet car
Payload (pounds)	45,200 – 61,740	42,990 – 47,400	39,690 – 57,330	38,580 – 56,220
(kilograms)	(20,500) (28,000)	(19,500) (21,500)	(18,000) (26,000)	(17,500) (25,500)
Inside dimensions:				
Length (feet-inches)	30– 4	38– 0	41– 7	41–10
(meters)	( 9.25 )	(11.58 )	(12.67 )	(12.75 )
Height (feet-inches)	6–10	6–11	7– 4	7– 4
(meters)	( 2.08 )	( 2.11 )	( 2.24 )	( 2.24 )
Width (feet-inches)	8–10	8– 5	8– 6	8–10
(meters)	( 2.7 )	( 2.57 )	( 2.6 )	( 2.7 )
Dimensions of doors:				
Height (feet-inches)	6– 6	6– 0	7– 0	7– 0
(meters)	( 2 )	( 1.83 )	( 2.13 )	( 2.13 )
Width (feet-inches)	6– 6	8– 2	8– 2	9–10
(meters)	( 2 )	( 2.5 )	( 2.5 )	( 3.00 )
Loadable surface (square feet)	271	322	355	365
(square meters)	(25 )	(29.6 )	(32.6 )	(33.6 )
Loadable volume (cubic feet)	2,224	2,621	2,895	2,987
(cubic meters)	(62.3 )	(73.4 )	( 81 )	(83.6 )
Number of pallets:				
32 x 48 in	21	27	30	30
(0.81 m) x (1.2 m)				
40 x 48 in	18	22	24	48
(1 m) x (1.2 m)				
Temperature control <sup>1</sup>	None	None	None	None

<sup>1</sup> Temperature in car depends on ambient temperature; however, portable heaters are available in cold weather.

TABLE 7.—European ice-refrigerated railroad cars (fig. 6)—general specifications

Outside length	2-axle, standard car	2-axle, large- capacity car	2-axle, very large- capacity car	4-axle, high- capacity car
Payload (pounds) (kilograms)	20,760 – 31,170 (9,417) (14,139)	31,970 – 36,280 (14,500) (16,500)	36,380 – 45,200 (16,500) (20,500)	80,480 – 99,220 (36,500) (45,000)
Inside dimensions:				
Length (feet-inches) (meters)	25– 2 ( 7.7)	28– 1 ( 8.6)	34– 9 (10.6)	54–11 (16.7)
Height (feet-inches) (meters)	6– 6 ( 2.0)	6– 6 ( 2)	6– 6 ( 2)	6– 6 ( 2)
Width (feet-inches) (meters)	8– 3 ( 2.5)	8– 6 ( 2.6)	8– 6 ( 2.6)	8– 6 ( 2.6)
Dimensions of doors:				
Height (feet-inches) (meters)	6– 1 ( 1.8)	6– 1 ( 1.8)	6– 1 ( 1.8)	6– 1 ( 1.8)
Width (feet-inches) (meters)	4– 3 ( 1.3)	4– 7 ( 1.4)	8–10 ( 2.7)	8–10 ( 2.7)
Loadable surface (square feet) (square meters)	210 (19.3)	237 (21.8)	296 (27.2)	457 (42)
Loadable volume (cubic feet) (cubic meters)	1,377 (38.5)	1,554 (43.5)	1,942 (54.4)	2,966 (83)
Number of pallets:				
32 x 48 in (0.81 m) x (1.2 m)	17	20	25	40
40 x 48 in (1.0 m) x (1.2 m)	14	14	20	32
Refrigerating equipment:				
Ice bunker	2 (±6,000 lb ice) (2,700 kg)	2 (±8,400 lb ice) (3,800 kg)	2 (±10,600 lb ice) (4,800 kg)	2 (±15,400 lb ice) (7,000 kg)
Ventilation <sup>1</sup>	4 fans (59 ft <sup>3</sup> sec) (1.6 m <sup>3</sup> sec)	4 fans (59 ft <sup>3</sup> sec) (1.6 m <sup>3</sup> sec)	4 fans (74 ft <sup>3</sup> sec) (2 m <sup>3</sup> sec)	4 fans (113 ft <sup>3</sup> sec) (3.2 m <sup>3</sup> sec)
Temperature ranges <sup>2</sup> (depending on the ice temperature)	30° – 35° F (–1 – +1° C)	30° – 35° F (–1 – +1° C)	30° – 35° F (–1 – +1° C)	30° – 35° F (–1 – +1° C)

<sup>1</sup> Some older type cars are fitted with ventilator fans, which are powered by the wind as the car moves.<sup>2</sup> Depends on temperature of the ice. Portable heaters are available in cold weather.

TABLE 8.—European mechanically refrigerated railroad cars  
(fig. 7)—general specifications

	Outside length	2-axle, very large capacity car	4-axle, high-capacity car	Outside length	20 feet	40 feet
Payload (pounds) (kilograms)	36,380 – 54,020 (16,500) – (25,500)	69,230 – 104,510 (31,400) – (47,400)		Payload (pounds) (kilograms)	43,650 (19,800)	50,450 (22,844)
Inside dimensions:				Inside dimensions: Length (feet-inches) Height (feet-inches) Width (feet-inches)		
Length (feet-inches) (meters)	37– 6 (11.4)	58– 2 (15.7)		Length (feet-inches) (meters)	16–10 (5.1)	36– 2 (11.0)
Height (feet-inches) (meters)	6– 6 (2)	6– 6 (2)		Height (feet-inches) (meters)	7– 3 (2.2)	7– 3 (2.2)
Width (feet-inches) (meters)	8– 4 (2.5)	8– 4 (2.5)		Width (feet-inches) (meters)	7– 0 (2.1)	7– 0 (2.1)
Dimensions of doors: Height (feet-inches) (meters)	6– 1 (1.8)	6– 2 (1.8)		Dimensions of doors: Height (feet-inches) (meters)	7– 3 (2.2)	7– 3 (2.2)
Width (feet-inches) (meters)	8–10 (2.7)	8–11 (2.7)		Width (feet-inches) (meters)	7– 0 (2.1)	7– 0 (2.1)
Loadable surface (square feet) (square meters)	312	485		Loadable surface (square feet) (square meters)	119 (11.0)	255 (23.5)
Loadable volume (cubic feet) (cubic meters)	(28.7)	(44.6)		Loadable volume (cubic feet) (cubic meters)	848 (23.7)	1,800 (50.4)
Loadable volume (cubic feet) (cubic meters)	2,048 (57.3)	3,143 (88)		Number of pallets: 32 x 48 in (0.81 m) x (1.2 m)	10 (1.0 m) x (1.2 m)	21 (0.81 m) x (1.2 m)
Number of pallets: 32 x 48 in (0.81 m) x (1.2 m)	28	39		Number of pallets: 40 x 48 in (1.0 m) x (1.2 m)	8 (1.0 m) x (1.2 m)	17 (1.0 m) x (1.2 m)
Refrigerating equipment: Self-sufficiency of the unit in days	22	30		Refrigerating equipment: Self-sufficiency of the unit in days	Mechanical	Mechanical
Refrigerating equipment: Self-sufficiency of the unit in days				Ventilation	4– 5 2 fans (27 ft <sup>3</sup> sec) (0.8 m <sup>3</sup> sec)	5– 6 2 fans (59 ft <sup>3</sup> sec) (1.7 m <sup>3</sup> sec)
Ventilation	7– 9 1 fan (49 ft <sup>3</sup> sec) (1.4 m <sup>3</sup> sec)	13 2 fans (88 ft <sup>3</sup> sec) (2.5 m <sup>3</sup> sec)		Temperature range	-13° to +59° F (-25° to +15° C)	-13° to +59° F (-25° to +15° C)
Temperature range	-13° – +68° F (-25° – +20° C)	-13° – +68° F (-25° – +20° C)				

TABLE 9.—European mechanically refrigerated van containers—  
general specifications

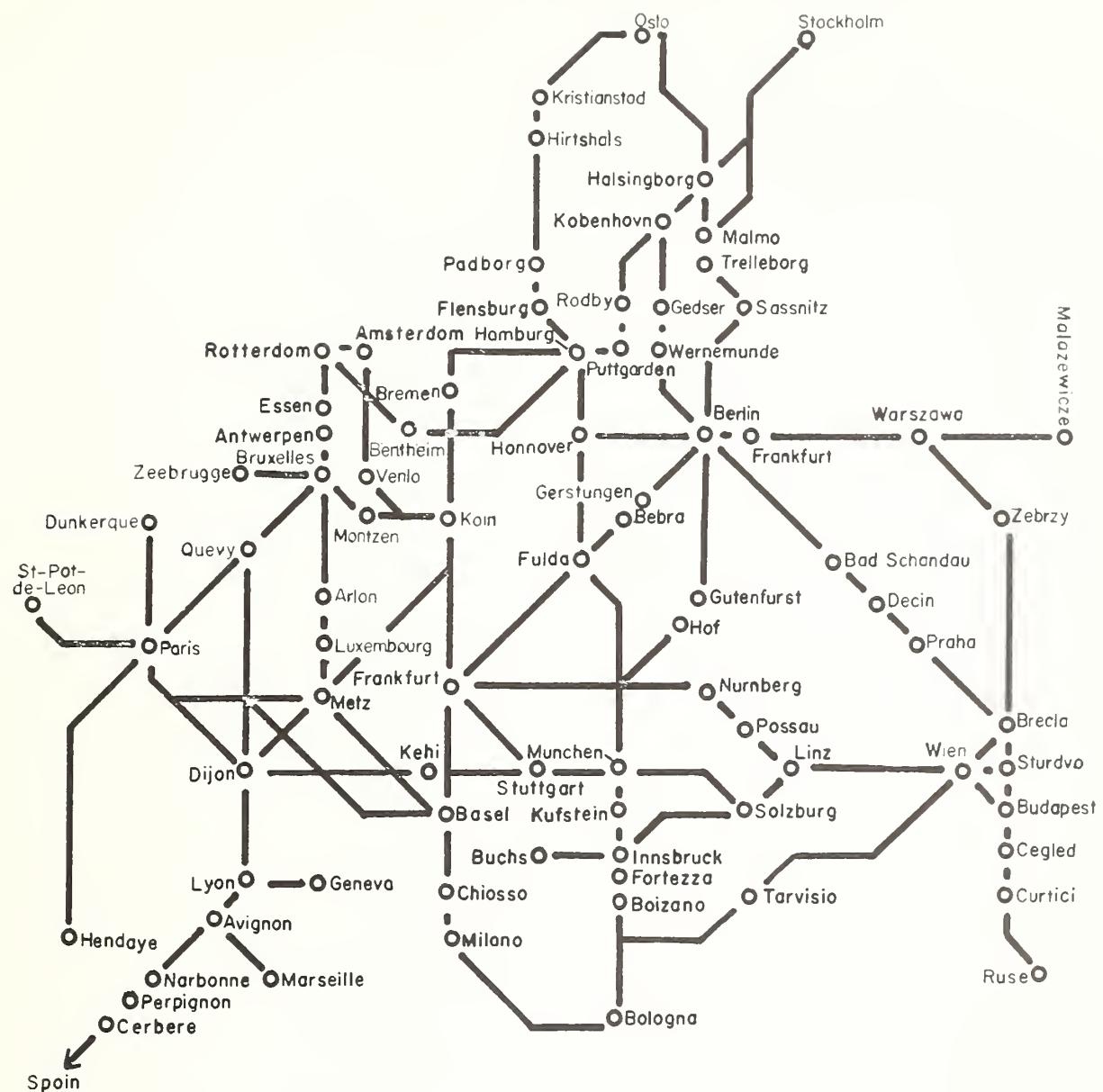


FIGURE 9.—Major rail routes in Europe.

## APPENDIX

## Footnotes for Table 3

*NETHERLANDS*

- a. On B roads, 7 ft 2 in (2.2 m).
- b. On B roads, maximum weight per wheel is 5,292 lb (2,400 kg).
- c. The figures for 3-axle, 4-axle, and 5-axle combinations are established by whichever is the more restrictive of either the sum of the axleload limits or the gross weight limits.

*BELGIUM*

- d. Not to exceed 22,050 lb (10,000 kg) per axle.

*WEST GERMANY*

- e. In the State of Saarland, 28,665 lb (13,000 kg).
- f. In the State of Saarland, 46,305 lb (21,000 kg).

*FRANCE*

- g. The total weight may never exceed 11,025 lb (5,000 kg) per meter (3 ft 3 in) distance between the first and last axles.

*ITALY*

- h. Axle distance up to 2 meters (6 ft 6 in).

*ENGLAND*

- i. With tandem axle spacing of:

41 - 47 in (12.5-14.3 m)	—	37,485 lb (17,000 kg)
47 - 53 in (14.3-16.0 m)	—	39,690 lb (18,000 kg)
53 - 59 in (16.0-18 m)	—	40,792 lb (18,500 kg)
59 - 72 in (17.9-22 m)	—	41,895 lb (19,000 kg)
More than 72 in (22 m)	—	44,100 lb (20,000 kg)

- j. Tractor and semitrailer with 3 axles; distance between the back axle of the tractor and the axle of the semitrailer:

Up to 6 ft 10 in (2.0 m)	—	44,100 lb (20,000 kg)
6 ft 10 in - 10 ft 6 in (2.0-3.2 m)	—	48,510 lb (22,000 kg)
Over 10 ft 6 in (3.2 m)	—	52,920 lb (24,000 kg)

Tractor with 3 axles and semitrailer with 1 axle; distance between the back axle of the tractor and the axle of the semitrailer:

Up to 6 ft 6 in (2.0 m)	—	48,510 lb (22,000 kg)
6 ft 6 in - 8 ft 10 in (2.0-2.7 m)	—	52,920 lb (24,000 kg)
8 ft 10 in - 9 ft 10 in (2.7-3.0 m)	—	57,330 lb (26,000 kg)

**ENGLAND—Continued**

9 ft 10 in – 13 ft 1 in (3.0–3.9 m)	—	61,740 lb (28,000 kg)
13 ft 1 in – 14 ft 5 in (3.9–4.4 m)	—	66,150 lb (30,000 kg)
Over 14 ft 5 in (4.4 m)	—	70,560 lb (32,000 kg)

Tractor with 2 axles and semitrailer with 2 or 3 axles; distance between the back axle of the tractor and the front axle of the semitrailer:

Up to 9 ft 6 in (2.9 m)	—	52,920 lb (24,000 kg)
9 ft 6 in – 10 ft 1 in (2.9–3.1 m)	—	57,330 lb (26,000 kg)
10 ft 1 in – 11 ft 9 in (3.1–3.6 m)	—	61,740 lb (28,000 kg)
11 ft 9 in – 13 ft 9 in (3.6–4.2 m)	—	66,150 lb (30,000 kg)
Over 13 ft 9 in (4.2 m)	—	70,560 lb (32,000 kg)

Tractor with 3 axles and semitrailer with 2 or 3 axles; distance between the back axle of the tractor and the front axle of the semitrailer:

Up to 6 ft 6 in (2.0 m)	—	52,920 lb (24,000 kg)
6 ft 6 in – 7 ft 6 in (2.0–2.3 m)	—	57,330 lb (26,000 kg)
7 ft 6 in – 10 ft 6 in (2.3–3.2 m)	—	61,740 lb (28,000 kg)
10 ft 6 in – 13 ft 1 in (3.2–4.0 m)	—	66,150 lb (30,000 kg)
Over 13 ft 1 in (4.0 m)	—	70,560 lb (32,000 kg)

**DENMARK**

- k. On secondary roads, 11 ft 9 in (3.6 m).
- l. On secondary roads, 45 ft 11 in (14.0 m).
- m. A single axle with 4 tires on main roads. On secondary roads, a single axle with 2 tires can carry 17,640 lb (8,000 kg).
- n. With tandem axle spacing of 39–78 in (1–2 m). On secondary roads, 31,972 lb (14,500 kg).
- o. On secondary roads, 70,560 lb (32,000 kg).

**IRELAND**

- p. With tandem axle spacing of 40–83 in (1.0–2.1 m), on a tractor or full trailer with a total weight of 55,125 lb (25,000 kg) or more, the axleload of a tandem can be 39,690 lb (18,000 kg).
- q. Distance between first and last axles:

Up to 24 ft (7.3 m)	—	55,125 lb (25,000 kg)
24 – 35 ft (7.3–10.7 m)	—	61,740 lb (28,000 kg)

## IRELAND—Continued

Over 35 ft (10.7 m)	—	70,560 lb (32,000 kg)
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## Footnotes for Table 4

*NORWAY*

- a. A special license is required for all vehicles more than 7 ft 8 in (2.3 m) wide, or a single axle weight more than 13,230 lb (6,000 kg), or a tandem axle weight more than 19,845 lb (9,000 kg), or a length of more than 32 ft 9 in (10 m).

*SWEDEN*

- b. On secondary roads, 17,640 lb (8,000 kg).  
 c. On secondary roads, 26,460 lb (12,000 kg).  
 d. Maximum weight 27,562 lb (12,500 kg) plus 551 lb (250 kg) for each 8 in (0.2 m) more than 7 ft 2 in (2.1 m) between the outside axles.

*AUSTRIA*

- e. With an axle distance from 3 ft 3 in (1 m) to 6 ft 6 in (2 m).

*SWITZERLAND*

- f. On secondary roads, 47 in (1.2 m).  
 g. With an axle distance from 39 to 78 in (1-2 m).

*PORTUGAL*

- h. With an axle distance of:

Up to 39 in (1 m)	—	22,050 lb (10,000 kg)
39-43 in (1.0-1.1 m)	—	25,357 lb (11,500 kg)
43-47 in (1.1-1.2 m)	—	28,665 lb (13,000 kg)
47-51 in (1.2-1.3 m)	—	31,972 lb (14,500 kg)
More than 51 in (1.3 m)	—	35,280 lb (16,000 kg)

*FINLAND*

- i. Maximum total weight is 38,587 lb (17,500 kg) plus 397 lb (108 kg) for each 4 in (0.1 m) more than 13 ft 1 in (4 m) between the outside axles with a maximum of 66,150 lb (30,000 kg).

*SPAIN*

- j. For tractor and semitrailer longer than 54 ft 1 in (16.5 m), a special yellow card license is required.  
 k. Maximum axle weight for a tandem 32,413 lb (14,700 kg) with axle spacing of 35 in (0.9 m) plus 1,543 lb (700 kg) for each additional 2-inch (0.05 m) spacing with a maximum axle spacing of 53 inches (1.53 m).  
 l. With a total weight over 35,280 lb (16,000 kg), a special yellow card license is required.

*GREECE*

- m. If axle is powered, 28,665 lb (13,000 kg) is allowed.

**TURKEY**

- n. The maximum weight for single and tandem axles depends on the distance between the first and last axle but cannot exceed:

39-75 in (1.0-2.0 m)	—	31,972 lb (14,500 kg)
19 ft 8 in - 22 ft 11 in (6.0-7.0 m)	—	44,100 lb (20,000 kg)
32 ft 9 in - 36 ft (10-11 m)	—	55,125 lb (25,000 kg)
45 ft 11 in - 49 ft 2 in (14-15 m)	—	66,150 lb (30,000 kg)

## Footnotes for Table 5

**HUNGARY**

- a. With an axle distance from 3 ft 3 in (1 m) to 6 ft 6 in (2 m).

**YUGOSLAVIA**

- b. Depends on the maximum axle weights with a maximum of 79,380 lb (36,000 kg) for 4-axle combinations. For 5 or more axle combinations, 88,200 lb (40,000 kg) is allowed.

**POLAND**

- c. Applies only on a few important international roads; all other roads, 17,640 lb (8,000 kg).  
 d. Applies only on a few important international roads; all other roads, 31,972 lb (14,500 kg).

**ROMANIA**

- e. On secondary roads, lower limits apply.  
 f. With a tandem axle, spacing up to 6 ft 6 in (2 m) is allowed.

**USSR**

- g. On secondary roads, 13,230 lb (6,000 kg).  
 h. On secondary roads, 24,255 lb (11,000 kg).  
 i. On secondary roads, 35,280 lb (16,000 kg).  
 j. On secondary roads, 44,100 lb (20,000 kg).  
 k. On secondary roads, 66,150 lb (30,000 kg).

**CZECHOSLOVAKIA**

- l. With tandem axle spacing of:

Up to 3 ft 3 in (1.0 m)	—	22,050 lb (10,000 kg)
3 ft 3 in - 3 ft 7 in (1.0-1.1 m)	—	25,357 lb (11,500 kg)
3 ft 7 in - 3 ft 11 in (1.1-1.2 m)	—	28,665 lb (13,000 kg)
3 ft 11 in - 4 ft 3 in (1.2-1.3 m)	—	31,972 lb (14,500 kg)
4 ft 3 in - 6 ft 6 in (1.3-2.0 m)	—	35,280 lb (16,000 kg)





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